Before the

FEDERAL COMMUNICATIONS COMMISSION

Washington, D.C. 20554

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In the Matter of	)	
Wireless E911 Location Accuracy	)	**PS Docket No. 07-114**
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REPLY COMMENTS OF iPosi, Inc.

TABLE OF CONTENTS

Comment Consensus Regarding Outdoor-to-Indoor Methods Unable to Consistently Meet Commission's Horizontal Location Accuracy Rules 3

Comment Consensus: Small Cells Serve as a Key, Probably an Essential Vehicle to Enable Indoor Location Accuracy 3

Comment Consensus: Indoor Barometric Differentials Can Lead to Calibration Inaccuracies for Z-Axis (Vertical Location) Measurements 4

Partial Rebuttal Reply Comment Regarding Barometric Sensor Absolute Accuracy 5

Reply Comment Regarding Policy Choices: We Recommend the Commission Follow Experience From Adoption of Other Building Safety Systems 5

Summary: Indoor Location Accuracy is an Urgent Priority but Requires Time 7

Reply Comments Introduction

In these Reply Comments iPosi, Inc. supports the Commission's indoor location objective to provide accurate, universal and reliable wireless E911 indoor location service that ensures virtually all consumers greater safety and levers new technology as much as possible. We have selected key points in our Reply that focus on critical positions and points made from Comments in this proceeding where we agree or align, and on one point where we partially disagree regarding sufficient sensor vertical measurement accuracy. We also submit in line with our and others' comments that new indoor location accuracy mandates should be measured and carefully timed to ensure commercially realistic targets are met. We again stress obligations and law regarding mandates for indoor location accuracy should focus compliance on parties or interests who own, manage or regulate thus those systems, largely inside private property, who mostly control installation of in-building systems. It is also appropriate to facilitate adoption of indoor systems by requiring FCC mandated type-accepted network equipment capable of 3D location to best achieve the Commission's indoor location accuracy objectives.

In alignment with the comments of the wireless operators and others, iPosi submits that the fastest path to achieving the Commission's goals would be to:

- Create a standards-based permanent test bed comprised of representative buildings to measure the performance of available technologies;
- Exert influence on local government to create building codes based on FCC type acceptance rules that support the installation of in-building Small Cells; and
- Create an environment that supports development of emerging accurate indoor location technologies

Comment Consensus Regarding Outdoor-to-Indoor Methods Unable to Consistently Meet Commission's Horizontal Location Accuracy Rules

Because the CSRIC test bed results did not meet the Commission's accuracy performance goals, and because many emerging companies did not participate while others chose their own 3rd party testing, most stakeholders agree that a permanent indoor test bed needs to be established in order to investigate new and emerging location technologies, including the use of Small Cells which have arisen as a more accurate solution, in order to produce "apples-to-apples" results.[1]

AT&T and others are recognizing the feasibility of determining a dispatchable address through the deployment of Small Cells.[2] Carriers and vendors alike recognize the opportunity that Small Cells provide, and in particular in urban settings where multipath, diffraction, and for vertical measurements, barometric pressure differentials are most pronounced.[3]

Comment Consensus: Small Cells Serve as a Key, Probably an Essential Vehicle to Enable Indoor Location Accuracy

As stated in our Comments[1], iPosi's technology solves indoor mobile location in a different way by using Small Cell self-surveyed location and time transfer originating from satellite constellations to develop an indoor reference frame to reference and range indoor mobiles within the location frame quickly and accurately. Given

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[1] "T-Mobile**,** USA, Inc. Comments on Third FNPRM on Location Accuracy, Before the Federal Communications Commission In the Matter of Wireless E911 Location Accuracy Requirements, PS Docket No. 07-114" (Hereafter referred to as "Comments by T-Mobile"), "T-Mobile and other stakeholders have repeatedly called for the establishment of a permanent indoor test bed that will allow for investigation of new and emerging location technologies.12 It is critical that all stakeholders have the opportunity to evaluate technologies that have the potential to improve wireless E911 location accuracy in a common, standardized, independently-run environment. In other words, the use of a single test bed to which all location vendors submit their technologies for evaluation will provide a real apples-to-apples comparison in regards to truly viable solutions." Page 8

[2] **"**Comments of AT&T, Before the Federal Communications Commission in the Matter of Wireless E911 Location Accuracy Requirements, PS Docket No. 07-114" (Hereafter referred to as "Comments of AT&T), "As discussed briefly above, AT&T is already providing dispatchable address through its small cell and 3G microcell deployments and hopes to introduce soon enhancements to its Wireless Home Phone solutions to do the same. AT&T may find other ways to incorporate these beacons in other devices it provides in connection with other services. And we fully expect that building owners and owners of commercial locations will enthusiastically embrace this endeavor—even without the need to legislate retro-fitting existing structures (although mandating retro-fitting is a good idea). Not only is the technology relatively inexpensive, but it would be a selling point to potential customers just as the existence of WiFi access is today." Page 4; and **Comments of Verizon**, "The FNPRM seeks comment on whether or in what manner wireless providers should deliver information to the PSAP regarding the Phase II technology that generated the call-specific location information.89 This too is a more appropriate subject for standards or best practices as between service providers and public safety stakeholders, given rapidly evolving wireless technology. Improvements in location resulting small cells, for example, could quickly render any new regulatory obligations outdated, as a "Phase I" fix for a small cell could potentially be more accurate than even a good GPS location fix.90" Page 31

[3] "Comments of Qualcomm, Incorporated, Before the Federal Communications Commission in the Matter of Wireless E911 Location Accuracy Requirements, PS Docket No. 07-114" (Hereafter referred to as "Comments by Qualcomm"), "The deployment of small cells also will help, as the Commission notes, because as "cell sizes shrink, the location of the serving cell itself may suffice for a position estimate for both E9-1-1 call routing and first responder dispatch [because] the base station itself can be a Phase II positioning technology."9 Our research shows that this approach can potentially work well, particularly in urban settings where there typically are multiple, overlapping means of wireless broadband access networks." Page 5

1 "Comments of iPosi, Inc., Before the Federal Communications Commission in the Matter of Wireless E911 Location Accuracy, PS Docket No. 07-114" (Hereafter referred to as Comments of iPosi"), "Instead of attempting to resolve location exclusively within the mobile device, we seek to enhance and exploit the Small Cells migration and continue the current platforms of GPS-location and synchronization, exploiting a diverse set of current and future indoor wireless infrastructures incorporating GNSS/GPS, 802.11v and subsequent network synchronism, as well as LTE and LTE/OTDOA global technology standards. This approach reduces commercial time to market concerns which relate to among other things, avoidance of requiring specially modified handsets. It is also targeted to work optimally indoors, and is cost effective." Page 4

common, standards-based timing and ranging, it is relatively seamless with conventional outdoor-centric mobile A-GPS/A-GNSS location. The latter is retained for providing rapid outdoor mobile location, good performance in transition out-to-indoor environments. Further, this new method does not require any alteration to many millions of mobile devices. Instead of relying on GPS signals in the handset to quickly determine location indoor (a low probability process), the iPosi solution uses generic IP network connectivity to create a next generation of assistance indoor-place GNSS embedded in Small Cells or access points. Levering the host cell's signal processing resources, the embedded Small Cell receiver can detect GPS/GNSS signals 500-1000 times weaker than the best mobile-assisted GPS/GNSS, while also delivering unprecedented reliability and jam-resistant accuracy.

Comment Consensus: Indoor Barometric Differentials Can Lead to Calibration Inaccuracies for Determining Z-Axis (Vertical Location)

When combined with the indoor barometric sensor in the Small Cell, the highest overall indoor mobile vertical accuracy is maintained. By referring the indoor mobile device barometric sensor to the same physical air-column, a key source of error is avoided. Besides iPosi, other Commenters have recognized interior installation of reference pressure avoids the barometric pressure differentials induced by sealed buildings can render z-axis measurements unreliable.[2] By relying on one or more barometric pressure readings from inside and on a common or adjacent floor of the building, iPosi's assisted GPS/GNSS signals can at least cross-verify a manually entered or directly assisted, calibrated vertical reference to accurately achieve close to +/- three (3) meters, provided the mobile barometric sensor absolute error is limited to 0.2hPa.[3] Other methods that measure pressure outside the building, typically at remote terrestrial beacons or cellular stations, are less likely to sense the indoor-outdoor pressure differential. Thus building interiors prone to high differential pressures, notably modern urban and suburban modern buildings, can introduce another source of error (even with perfect barometric sensors) exceeding the Commission's proposed accuracy limit and goals.[4]

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[2] Comments of AT&T**,** "Insofar as vertical (z-axis) data would be dependent upon "barometric pressure sensors in mobile devices to provide rough z-axis information when calls are placed from multi-story building," the Commission should recognize that barometric sensors in mobile devices can be adversely impacted by building design and construction. Many buildings are designed to be pressurized. Multi-story residential buildings and high-rise office towers are designed for HVAC systems that maintain a positive air pressure. While this increase in building pressure is not high, it is large enough to render uncompensated barometric pressure sensors useless as indoor altimeters. A one percent increase in pressure is not uncommon, and an increase of that magnitude would produce a z-axis error of about one story." Page 15

[3] **Comments of iPosi ,** "Applying iPosi GNSS/GPS signal processing, the company has demonstrated vertical GNSS/GPS accuracy error levels into Small Cell nodes inside challenging building environments to less than three meters allowing a sufficient number of measurements to occur within a day or so of initial cell installation. Since the Small Cells are stationary and networked, this small error provides a source of independent elevation calibration to continuously reference and counteract barometric MEMs sensor drift (which can reach tens of meters) and ultimately calibrate nearby mobiles whether on the same, or adjacent floors. Fusing GNSS capability with a built-in inexpensive mobile-grade barometric sensor into the Small Cell can provide enough accuracy to meet the FCC's proposed 3-meter vertical accuracy requirement, and will serves as an important improvement to general, everyday indoor location services or applications." Page 5-6; Table: Commercial MEMs Barometric Sensor Relative and Absolute Errors, Page 17

[4] "Comments of Sprint Corporation Before the Federal Communications Commission in the Matter of Wireless E911 Location Accuracy Requirements, PS Docket No. 07-114" (Hereafter referred to as "Comments by Sprint") "Although some handsets that are commercially available today may contain barometric pressure sensors, using this technology to provide location information as part of 9-1-1 would be a new application of this technology and there is very little, if any, data available regarding the reliability or accuracy of these sensors, especially in the broad range of environments and weather conditions in which these devices must operate. In addition, methods to calibrate or differentially correct these sensor readings are not standardized for the purposes of E-9-1-1 position location. For example, barometric sensors need to be calibrated regularly for changeable local conditions if they are going to work the way they do in aviation settings.14 The method by which a mobile device might request or be instructed to request calibration information does not exist yet and should be part of a protocol stack defined in an industry specification. In addition, there can be significant pressure variability inside buildings, and barometric sensors can be inaccurate depending on the pressure characteristics within buildings.15 With a solution based on physical and environmental factors, such as a barometric pressure sensor technology, there is likely to be a lot of variability in manufactured devices, so device manufactures will need to be involved and participate in any technology certification process that occurs. Because this is a relatively new technology, more industry standards work and certification work would need to be completed

Partial Rebuttal Reply Comment Regarding Barometric Sensor Absolute Accuracy

In their comments[5] regarding their barometric sensor absolute accuracy performance Bosch stated that "The (Bosch) BMP180 is capable of measuring ambient pressure with an absolute accuracy of approximately 0.12 hectopascal ("hPa") units, which is the equivalent to approximately 1 meter of change in altitude at standard sea level."

We agree that a figure similar to .12 hPa will achieve the FCC accuracy objective. However, the Bosch comment appears inconsistent with BMP180 the datasheet, see appendix, which states that the "typical" absolute accuracy is -1 hPa, +/- 1 hPa, thus the absolute typical accuracy can be in a range from 0 to -2 hPa. Further, the datasheet indicates the worst case absolute accuracy varies between -4 to +2 hPa. Both the typical and worst case absolute accuracy figures exceed by many times the commented absolute accuracy figure of +/- .12 hPa. There is more than an order of magnitude inconsistency between these figures.

Relative accuracy specifies how accurately the barometric sensor responds to air pressure change between its last and current readings in accordance with a physical change of ambient air pressure. However, it does not address how accurately an absolute reading is and which is based on the ambient absolute pressure reflecting its elevation above the ground. It only relates to the change in pressure about an absolute value. These sensors specify two dimensions of measurement accuracy, relative and absolute, to fully characterize the accuracy in the target application.

Reply Comment Regarding Policy Choices: We Recommend the Commission Follow Experience from Adoption of Other Building Safety Systems

In line with T-Mobile's comments[6] and those of other wireless operators, we encourage the Commission to consider a different policy approach to reach its indoor accuracy objectives. Specifically, we recommend a broader and more local government scope of compliance to install 3D Location-aware Small Cell systems in buildings.

We believe it's futile to only obligate wireless operators (CMRS) to the task of achieving desired E911 accuracy that is without cohesive local government, building owner and tenant participation. These interests control their interior wireless propagation "airspace" much more than the operators. We suggest the Commission consider instead working with its federal and local agencies to develop a set of coordinated actions ranging from

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before barometric pressure readings can be relied upon for accurate 9-1-1 location efforts." Page 7-8 "In addition, there can be significant pressure variability inside buildings, and barometric sensors can be inaccurate depending on the pressure characteristics within buildings.15 Page 8

Comments of T-Mobile, "Critically, though the use of barometric pressure to track relative changes in altitude over short periods of time is relatively straightforward, barometric pressure measurement by a handset alone cannot produce an accurate absolute altitude estimate either indoors or outdoors.21 Accurate absolute vertical measurements must rely on an initial pressure reference (calibration) measurement made in real-time from a sensor at a known altitude in the same atmospheric conditions as the handset. While it may be reasonable in some cases to assume that an outdoor calibration sensor will be in the same atmospheric conditions as a handset inside a building, in many other cases, this assumption will not be reasonable. Some challenges arise from mechanical systems common in semi-sealed, environmentally controlled buildings (which includes most modern multistory office buildings)." Page 13-14

[5] "Comments of Bosch Sensortec" to PS Docket No. 07-114, May 12,2014

[6] Comments of T-Mobile, "No matter what, it will take many years—more than the five contemplated in the Commission's proposed rules—to develop and implement enhanced indoor location technologies in consumers' handsets. And even with the Commission's proposed new requirements, at the end of that process public safety will still not have an actionable address, including floor level, for dense urban environments. Rather than just trying to shrink the location estimate circle by a number of meters, it would be much better to end this multiyear transition with an indoor location solution that really meets public safety's needs and delivers actionable dispatch information. But this can only be accomplished by forging a more creative and effective multi-stakeholder approach, one that looks not only to carriers, technology vendors, mobile operating systems providers, and public safety, but also to state and local governments as well as premises owners." Page 5 – 6

education to model municipal codes -- some supported as needed by federal legislation, plus use the Commission's equipment Type Acceptance authority to specify compliant 3D location-aware capability for Small Cells. Taken in concert, these steps empower local and state governments that rely on the FCC as an expert agency but enforce in-building accuracy compliance through timely installation paralleling building safety codes already widely enacted by state and local governments.

Operators today are directly or through their end-customers, already installing licensed and unlicensed access Small Cells which we assert to be the logical platform for in-building mobile location systems. As iPosi stated in its Comments[7], operators may transmit signals that might ultimately reach a percentage of areas inside buildings from their distant, outdoor rooftop or tower stations. These assets are designed to achieve competitive outdoor coverage and capacity, and clearly enhance outdoor E911 coverage as well. However, the operators have no control over radio propagation characteristics as the operator's carrier waves penetrate the highly variable building structures. Multiple reflections, diffractions, and scattering, which often enhance coverage, also reduce the accuracy of "outdoor-in" static ranging measurements on which the network or beacon location determination proposals or existing solutions are built. This observation is consistent with the CSRIC test bed results that showed these "outdoor-in" beacon methods – while serving clear radio-path, outdoor location well-- are incapable of meeting the Commission's or even tougher standards for mobile indoor accuracy.

Most agree that while handset AGPS/AGNSS-based location works quite well outdoors,[8] exclusively relying on handset based location approaches are challenged when it comes to indoor environments. Thus we believe that relying on the same technology or architectural approach to meet indoor location requirements by extending Phase II E911, a de facto outdoor mandate, to CMRS entities by requiring them to bear the responsibility of rolling out new handsets or other macro-cellular overlaying systems to meet unachievable indoor deadlines, is untenable. There is need for a different approach.

Historically Analogous Public Safety Systems Provide a Roadmap for Today's Location Accuracy Challenges

Though the indoor problem is significant and the way to effect a solution equally substantial, we believe it can be resolved by looking at an analogous case of building safety systems - the now ubiquitous indoor automatic fire sprinkler system - a 19th century innovation that has interesting parallels for achieving 21st century building safety such as systematic mobile indoor location.

In 1874, the first U.S. automated sprinkler was installed in a Connecticut piano factory; since then proving effective in the U.S. and other countries, they have become through mostly local government action, mandatory

[7] Comments of iPosi, "Aside from significant economic constraints these choices impose, outdoor cell towers (whose signals often traverse 500 to 5000 meters over or around urban/suburban terrain) face fundamental limits to deliver indoor mobile location accuracy due primarily to radio signal diffraction and multipath reflections. The ranging-signal sources are fixed, and thus one cannot reduce path errors without more terrestrial infrastructure beacons, unless one removes surrounding radio obstructions." Page 9

[8] Comments of T-Mobile, "The outdoor location accuracy rules function well, and carriers are on a path to a unified accuracy standard. The percentage of PSAPs in which a carrier is required to meet the accuracy standards continues to ratchet up. 46 This path remains very challenging, and compliance—even with today's best performing technologies—is far from certain. Rather than accelerate the outdoor location benchmarks or adopt a unitary standard on a short time frame, the Commission should retain the existing benchmarks. As T-Mobile has said before, the move to handset-based accuracy will always be subject to the ability of carriers to roll out new handsets throughout their footprint. That process is difficult if not impossible to accelerate. Pushing the existing time frame up would impose enormous burdens on carriers, at precisely the same time that those carriers are working hard to deploy new network technologies that hold the promise of real improvements to location accuracy in all environments." Page 21-22

throughout the U.S. in hospitals, nursing homes, schools, hotels, residential condominiums, and other public buildings, subject to local government building codes and enforcement.[9]

Rulemaking followed the statistics which revealed over the course of installation history that automatic sprinklers probably save lives and mitigate property loss. The effectiveness of automatic sprinkler systems has been compelling. According to the American Fire Safety Association, "Statistics demonstrate that there has never been any multiple loss of life in a fully sprinklered building." Additionally, "The combination of automatic sprinklers and early warning systems in all buildings and residences could reduce overall injuries, loss of life and property damage by at least 50%."[10] Insurance companies recognize the property and loss of life cost savings and provide discounts to building owners who comply with regulations. Building owners and their insurers recognize the value of investing up-front capital in order to save on insurance and property loss, repairs, and lawsuits.

Although automatic sprinklers have now become de rigeur for interior safety and are required to be installed under certain local building codes or similar compliance criteria, it indeed took some time, years in fact, for local governments to universally establish these into their building codes, and there is very little the federal level could do. Instead, the federal government creatively sought universal minimum standards compliance by exercising its essentially commercial influence in the interest of public safety. Among federal actions, the Congress passed "The Hotel and Motel Safety Act" in 1990 which mandates "any hotel, meeting hall, or similar institution that receives federal funds (e.g., for a government traveler's overnight stay, or a conference, etc.) must meet (minimum) fire and other safety requirements."[11]

Using a similar coordinated policy-setting template that involves local/federal action and precedent, the Commission and agency avoid an undesirable set of misplaced legal obligations on operators who lack control over securing location accuracy over several million structures across America. By organizing a shared responsibility as T-Mobile's comments pointed out[12] – local governments, manufacturers of Small Cells, insurance companies, and especially building management, tenant and owners, fixed and mobile network operators on technical interface standards and network access for Small Cells in America's commercial and multi-unit residential buildings – an existing trend towards Small Cell use for indoor communication will be accelerated, and we believe, meet the true objective: ensuring public safety.

Summary: Indoor Location Accuracy is an Urgent Priority but Requires Time

It is widely agreed that the technology that is currently available needs to be given enough time to synthesize and deploy.[15] Additionally, it is recognized through the CSRIC test bed results as well as the current integration of

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[9] http://en.wikipedia.org/wiki/Fire_sprinkler_system "As more and more hotels upgraded their facilities to enable acceptance of government visitors, this type of construction became the de facto industry norm – even when not directly mandated by any local building codes."

[10] http://www.afsascholarship.org/aboutfiresprinklers.html

[11] "The Hotel and Motel Safety Act of 1990" http://www.gsa.gov/portal/content/102177

[12] Comments of T-Mobile, "The plain fact is that, while wireless carriers can continue to make incremental improvements, they cannot by themselves deliver fully "actionable" horizontal and vertical indoor location estimates; when limited to technologies that wireless carriers can incorporate in their networks or handsets, a wireless carrier can only generate estimated center coordinates for a two- or, in some instances, three-dimensional probabilistic search radius. Put more simply, regardless of whether the proposed new accuracy standards are adopted, if the Commission and public safety rely solely on wireless carriers to provide location information, it will always be possible that the caller is on some other floor or in a different building. To attain truly actionable indoor locations requires buy-in and development from all stakeholders—not just wireless carriers, but also public safety, handset manufacturers, location technology vendors, mobile operating system providers, state and local governments who regulate building codes, and, perhaps most critically, premises owners. "Smart buildings" should be more than just wired—they should also be capable of providing actionable locations to any mobile device (including Wi-Fi-only devices)." Page 1-2

[15] **"**Comments of Verizon and Verizon Wireless, Before the Federal Communications Commission in the Matter of Wireless E911 Location Accuracy Requirements, PS Docket No. 07-114" (Hereafter referred to as "Comments of Verizon") "To that end, the

Small Cells into existing environments, that emerging Small Cell based technologies may in fact provide the most accurate and reliable solution, and require an organized, team approach in order to become fully operational.[16]

As such and as noted above and in earlier Comments by many, the Commission should engage in practices that will encourage multi-stakeholder, "eco-system" responsibility from which real and meaningful collaborative effort happens. iPosi would again therefore encourage the Commission to recognize 1) the unique values of indoor Small Cell deployment; 2) allow sufficient time to create a permanent test bed to ensure that the resulting technology is truly reliable for determining an E911 caller's dispatchable address based on a caller's verified and precise indoor location; and 3) create conditions affording innovative built-in 3D location awareness and other Small Cell-centric solutions such as enabling First Responders ability to access on their arrival the in-building Small Cell LTE network location functionality. This could enable them to trace in real-time their best route toward rescue of the E911 caller based on receiving and processing the same cell 3D locations, proximity/association and OTDOA ranging parameters.

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iPosi is a private GNSS/GPS technology development company that is developing embedded location and timing technology solutions. Its headquarters are in Denver, Colorado with labs in Boulder, Colorado. iPosi uses advanced signal processing using embedded soft-core, high density processing techniques to extract, refine extremely weak in-building GPS and GNSS satellite signals. This enables extreme sensitivity, accurate and jam-resistant reception for diverse applications from locating mobile devices deep inside urban settings to increasing radio anti-jam immunity to protect either in- or outdoor critical infrastructure systems that rely on GPS.

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Commission should establish policies to encourage "Phase III" of its E911 location framework by leveraging developments already occurring in the broader wireless marketplace and giving wireless providers incentives to employ new technologies.26 Developments occurring in the commercial LBS market that leverage Wi-Fi access points, for example, may be more aligned with public safety's long term goal, and the Commission should consider how to align its policies accordingly. The framework should also leverage the increasing availability of other commercial products across the wireless ecosystem, including consumer-level products and non-traditional network architectures, that increase the number of wireless access points with known fixed addresses that may be able to provide more accurate information about the location of the 911 caller." Page 11

[16] Comments of Qualcomm, "The Commission should at this point in time continue to strongly encourage the intensive positioning technology R&D work, extensive integration and verification efforts by wireless carriers, infrastructure vendors, and handset suppliers, as well as close interaction with the public safety community, as they jointly develop, analyze and refine the next generation of location determination tools that will improve upon the current capabilities by providing improved accuracy for all wireless E911 emergency callers." Page 21

Appendix

1. Electrical characteristics

If not stated otherwise, the given values are ±3-Sigma values over temperature/voltage range in the given operation mode. All values represent the new parts specification; additional solder drift is shown separately.

Table 1: Operating conditions, output signal and mechanical characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Units
Operating temperature	T_A	operational	-40		+85	°C
		full accuracy	0		+65	
Supply voltage	V_{DD}	ripple max. 50mVpp	1.8	2.5	3.6	V
			1.62	2.5	3.6	
Supply current @ 1 sample / sec. 25°C	I_{DDLOW}	ultra low power mode		3		µA
	I_{DDSTD}	standard mode		5		µA
	I_{DDHR}	high resolution mode		7		µA
	I_{DDUHR}	Ultra high res. mode		12		µA
	I_{DDAR}	Advanced res. mode		32		µA
Peak current	I_{peak}	during conversion		650	1000	µA
Standby current	I_{DDSBM}	@ 25°C		0.1	4[1]	µA
Relative accuracy pressure V_{DD} = 3.3V		950 . . . 1050 hPa @ 25 °C		±0.12		hPa
				±1.0		m
		700 ... 900hPa 25 . . . 40 °C		±0.12		hPa
				±1.0		m
Absolute accuracy pressure V_{DD} = 3.3V		300 . . . 1100 hPa 0 . . . +65 °C	-4.0	-1.0*	+2.0	hPa
		300 . . . 1100 hPa -20 . . . 0 °C	-6.0	-1.0*	+4.5	hPa
Resolution of output data		pressure		0.01		hPa
		temperature		0.1		°C
Noise in pressure		see table on page 12-13				
Absolute accuracy temperature V_{DD} = 3.3V		@ 25 °C	-1.5	±0.5	+1.5	°C
		0 . . . +65 °C	-2.0	±1.0	+2.0	°C

[1] at 85°C